

CLAIMS

1. A spray nozzle (10) comprising a central tube (26) with a central passage (12) for supply of a liquid, the passage terminating in an orifice (14) for discharge of the liquid, a second tube (28) surrounding the central tube (26) whereby a first passage (16) is defined between the central tube (26) and the second tube (28) for supply of primary air, a nozzle cone (32) positioned at the end of the second tube (28) and defining the outer periphery of a first discharge gap (18) of the first passage (16), causing air supplied through the first passage (16) to be mixed with the liquid to provide a liquid/air spray (20), a third tube (30) surrounding the second tube (28) whereby a second passage (22) is defined between the second and the third tube (30) for supply of secondary air, and a jacket (34) positioned at the end of the third tube (30) and defining the outer periphery of a second discharge gap (24) of the second passage (22),
- characterised in that
- the nozzle cone (32) is adjustably positioned at the end of the second tube (28) for adjustment of the size of the first discharge gap (18).
2. A spray nozzle (10) according to claim 1, wherein the nozzle cone (32) is removably attached to the second tube (28).
3. A spray nozzle (10) according to claim 1 or 2, wherein the jacket (34) is adjustably positioned at the end of the third tube (30) for adjustment of the size of the second discharge gap (24).
4. A spray nozzle (10) according to any of the preceding claims, wherein the jacket (34) is removably attached to the third tube (30).
5. A spray nozzle (10) according to any of the preceding claims, wherein the first discharge gap (18) is positioned at a distance upstream in relation to the orifice (14).
6. A spray nozzle (10) according to any of the preceding claims, wherein the second discharge gap (24) is positioned at a distance upstream in relation to the first discharge gap (18).

7. A spray nozzle (10) according to any of the preceding claims, wherein the central tube (26) is removable.
8. A spray nozzle (10) according to any of the preceding claims, further comprising a removable nozzle tip (13) positioned at the end of the central tube (26) and comprising the
5 orifice (14).
9. A spray nozzle (10) according to claim 7, wherein the central tube (26) and the nozzle tip (13) constitutes a removable unit of the spray nozzle (10).
10. A spray nozzle (10) according to any of the preceding claims, wherein the central tube (26) is a flexible hose, e.g. comprising a Teflon® liner.
- 10 11. A spray nozzle (10) according to any of the preceding claims, wherein the nozzle cone (32) is made of stainless steel.
12. A spray nozzle (10) according to claim 11, wherein the second tube (28) is made of a different type of stainless steel whereby reaming is suppressed.
13. An apparatus (40) for controlled agglomeration, comprising
- 15 a spray nozzle (10) according to any of the preceding claims,
- a fluid bed (42) for fluidisation of a second composition (44) having a temperature of at the most a temperature corresponding to a melting point of a carrier (48), such as a temperature of at least about 2 °C, at least about 5 °C or at least about 10 °C lower than the melting point of the carrier (48), the spray nozzle (10) being mounted in the fluid bed
20 (42) for spraying a first composition (46) comprising the carrier (48) in liquid form on the second composition (44) fluidised in the fluid bed (42),
- a temperature and pressure controlled tank (50) containing the first composition (46), and connected to the central passage (12) for supply of the first composition (46) at a temperature above the melting point of the carrier (48),
- 25 a first temperature controlled pressurised air supply (52) that is connected to the first passage (16) for supplying temperature controlled primary air to the spray nozzle (10), and

a second temperature controlled pressurised air supply (54) that is connected to the second passage (22) for supplying temperature controlled secondary air to the spray nozzle (10).

14. An apparatus (40) according to claim 13, wherein the carrier 48 has a melting point of
5 about 5 °C or more such as, e.g., about 10 °C or more, about 20°C or more or about 25 °C or more.

15. An apparatus (40) according to claim 13 or 14, wherein the temperature of the supplied primary air is above the melting point of the carrier.

16. An apparatus (40) according to any of claims 13-15, wherein the temperature of the
10 supplied secondary air is at the lower end of the melting temperature range of the carrier.

17. An apparatus (40) according to any of claims 13-16, wherein the fluid bed is a roto fluid bed.

18. An apparatus (40) according to any of claims 13-16, wherein the fluid bed is a Wurster fluid bed.

15 19. An apparatus (40) according to any of claims 13-16, wherein the fluid bed is a Kugel coater.

20. An apparatus (40) according to any of claims 13-16, wherein the spray nozzle (10) is mounted at the top of the fluid bed (42).

21. An apparatus (40) according to any of claims 13-16, wherein the spray nozzle (10) is
20 mounted at the bottom of the fluid bed (42).

22. An apparatus (40) for controlled agglomeration, comprising

a spray nozzle (10) according to any of claims 1-12,

an intensive mixer for mixing of a second composition (44) having a temperature of at the most a temperature corresponding to a melting point of a carrier (48), such as a
25 temperature of at least about 2 °C, at least about 5 °C or at least about 10 °C lower than the melting point of the carrier (48), the spray nozzle (10) being mounted in the mixer for spraying a first composition (46) comprising the carrier (48) in liquid form on the second composition (44) during mixing in the intensive mixer,

a temperature and pressure controlled tank (50) containing the first composition (46), and connected to the central passage (12) for supply of the first composition (46) at a temperature above the melting point of the carrier (48),

5 a first temperature controlled pressurised air supply (52) that is connected to the first passage (16) for supplying temperature controlled primary air to the spray nozzle (10), and

a second temperature controlled pressurised air supply (54) that is connected to the second passage (22) for supplying temperature controlled secondary air to the spray nozzle (10).

10 23. An apparatus according to claim 22, wherein the intensive mixer is a high shear mixer.

24. An apparatus according to claim 23, wherein the intensive mixer is a low shear mixer.

25. An apparatus according to any of claims 22-24, wherein the intensive mixer is a horizontal mixer.

15 26. An apparatus according to any of claims 22-25, wherein the intensive mixer is a vertical mixer.

27. A spray dryer with a spray nozzle according to any of claims 1-12.

28. A spray dryer according to claim 27, wherein the spray nozzle (10) is mounted at the top of the spray dryer.

20 29. A spray dryer according to claim 27, wherein the spray nozzle (10) is mounted at the bottom of the spray dryer.